

# NATO - OTAN

**The Research & Technology  
Organisation (RTO)**

**The NATO Modelling & Simulation  
Group (NMSG)**



*North Atlantic Treaty Organisation*



**Briefing to the MSG-079 Workshop  
Farnborough, UK, 24-25 Feb 2010**

**Prepared by NATO M&S Coordinaton Office (MSCO)  
Speaker: Adrian Voiculet, MSCO Technical Officer**

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<b>19a. NAME OF RESPONSIBLE PERSON</b>				



# Content

- The NATO Research & Technology Organization (RTO)
  - Place in NATO
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# North Atlantic Treaty Organization

**28 Member Nations**



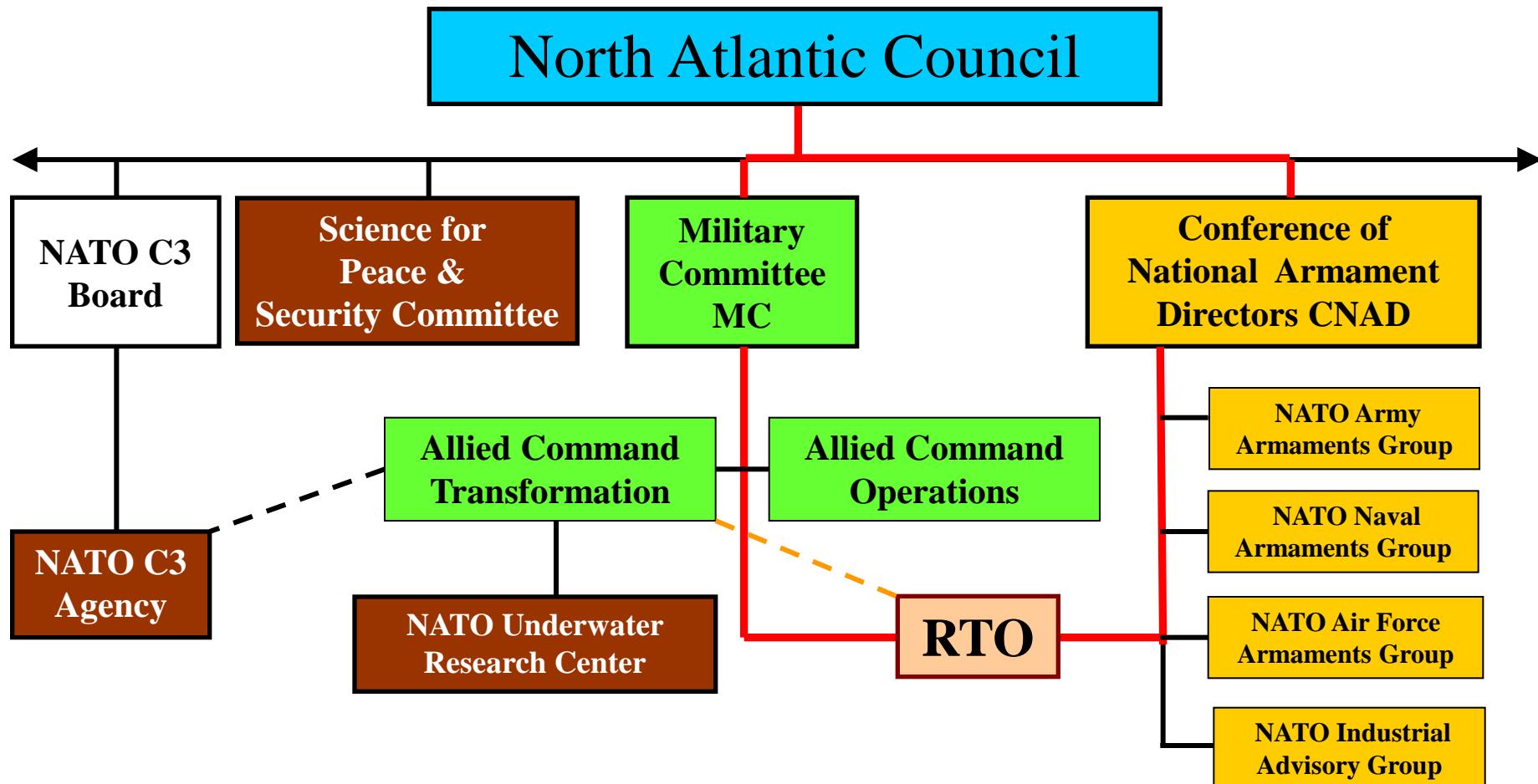


# The Research & Technology Organization

- NATO Body funded 1<sup>st</sup> Jan 1998
- Unique forum for Technological Exchange
- Leader in NATO R&T
- Considered as a force multiplier in NATO
- Young organization but still in evolutionary phase: need to adapt to new NATO
- Many challenges ahead
- Includes RTB, RTA, Panels, NMSG ....



# The Place of the RTO in NATO





## The RTO Mission

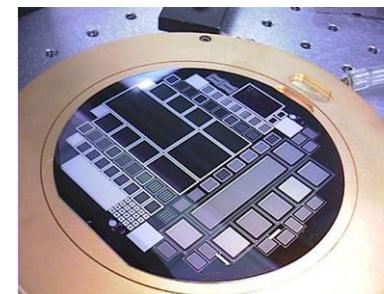
To conduct and promote **co-operative research** and **information exchange** within NATO and with its “Partners”.





# The RTO Objectives

- To support the development and effective use of national defence R&T and thus to maintain a **technological lead** within the Alliance,



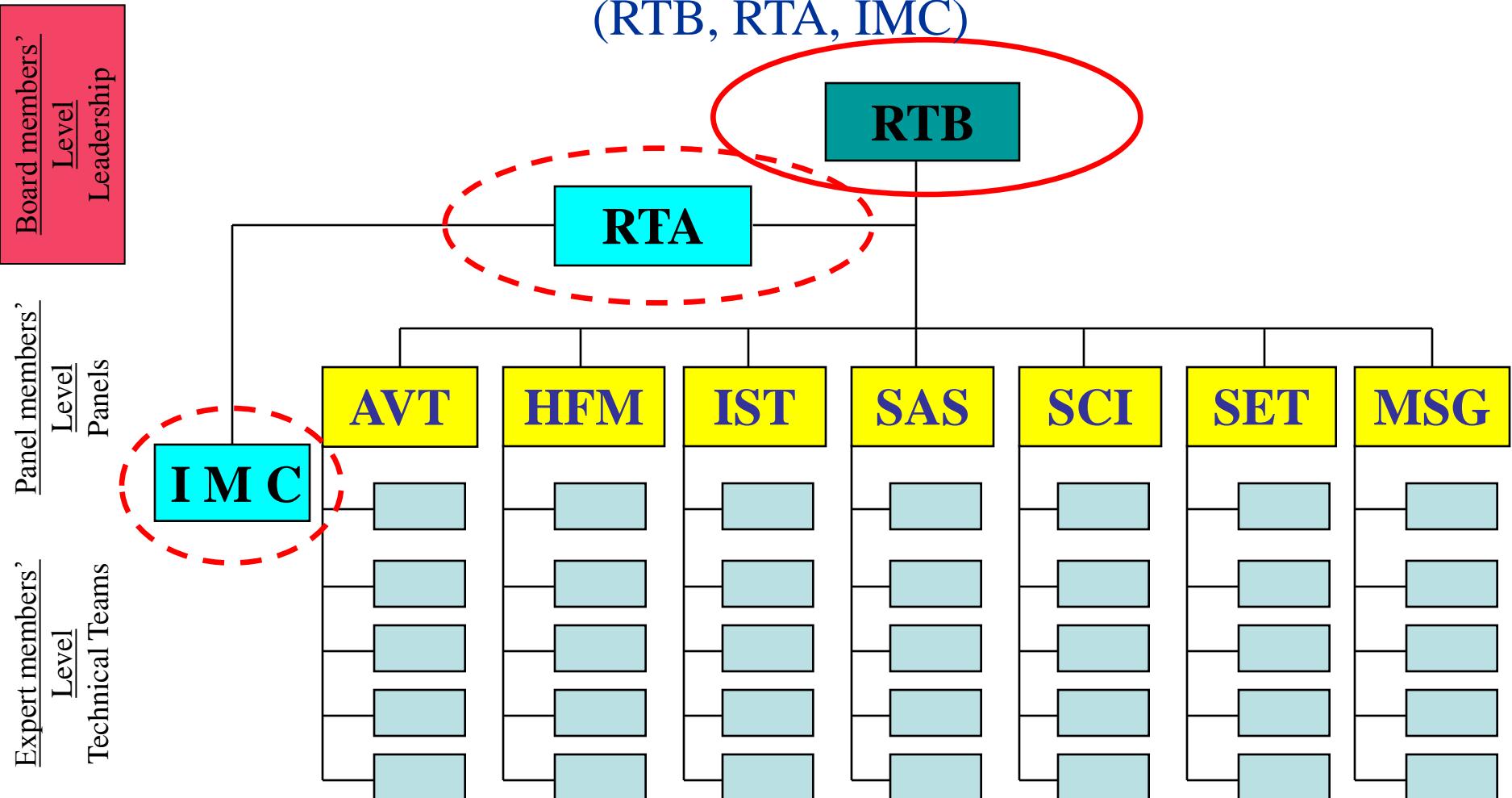
- To meet the **military needs** of the Alliance,
- To provide **advice** to NATO and national decision makers.





# RTO: 1<sup>st</sup> Level

(RTB, RTA, IMC)





## RTO 1<sup>st</sup> Level: Decision body RTB

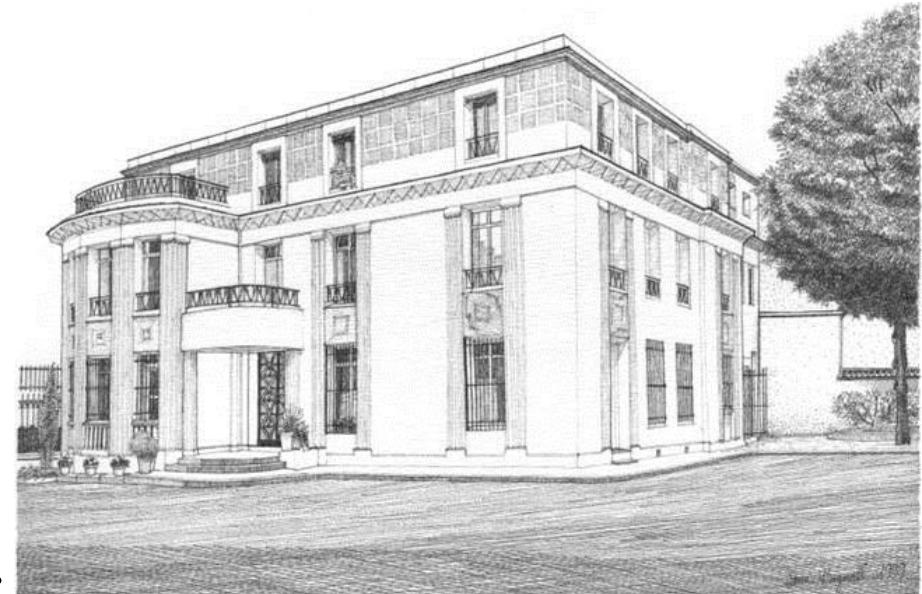
- A Research & Technology Board (**RTB**)
  - Decision on RTO policy
- Supported by an Agency (**RTA**)
  - Permanent Support
- Which is supported by the IMC

Information Management Committee



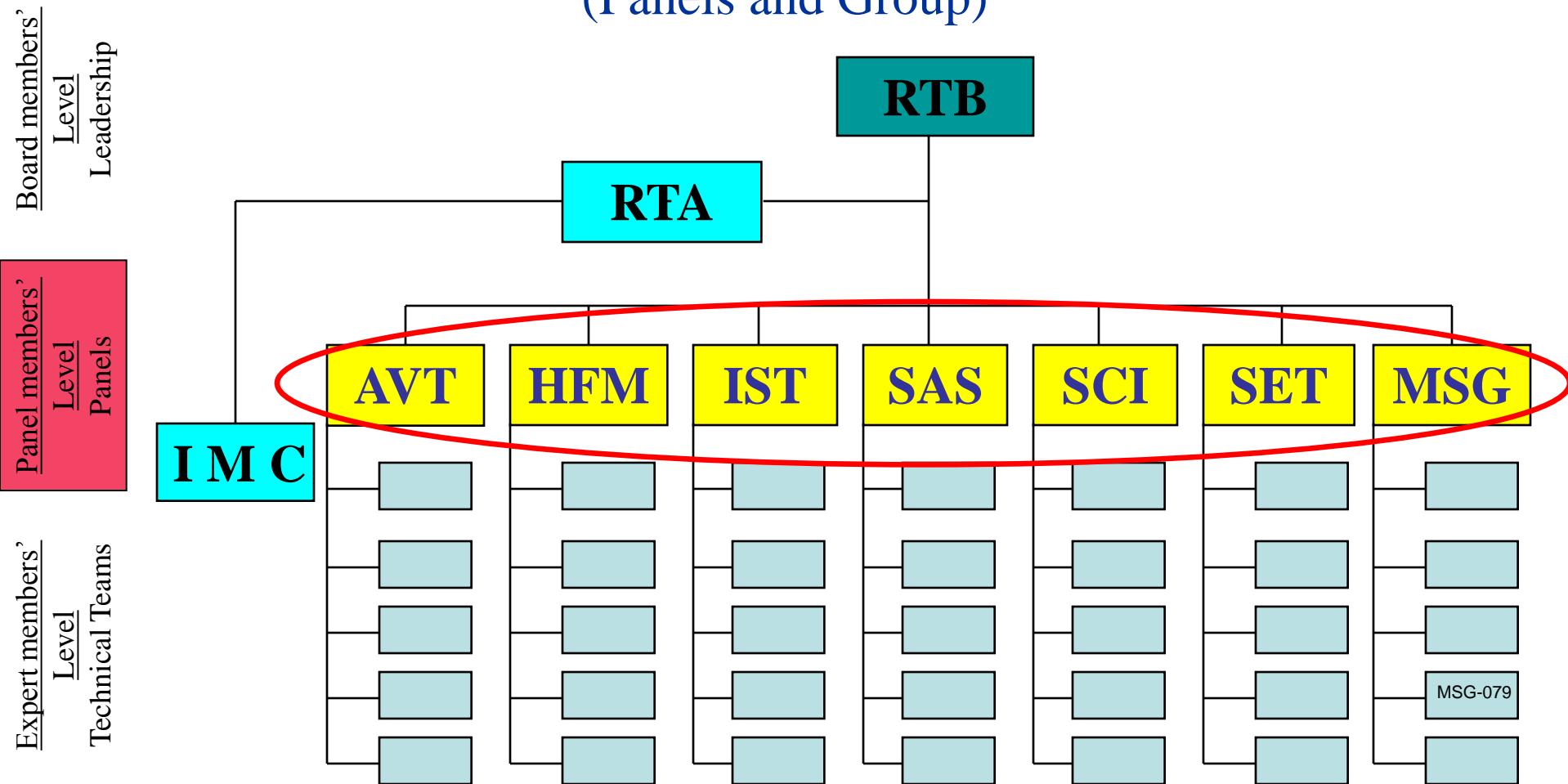
# RTA: The Research & Technology Agency

- RTA is the permanent structure for the RTO
- Unique mix of NATO Civilians (39) and IMPs/VNCs (14)
- Located in Paris,  
small group in NATO HQ
- Provide administrative support to the RTB,  
Panels, NMSG and to the scientific RTO community.





## RTO: 2<sup>nd</sup> Level (Panels and Group)





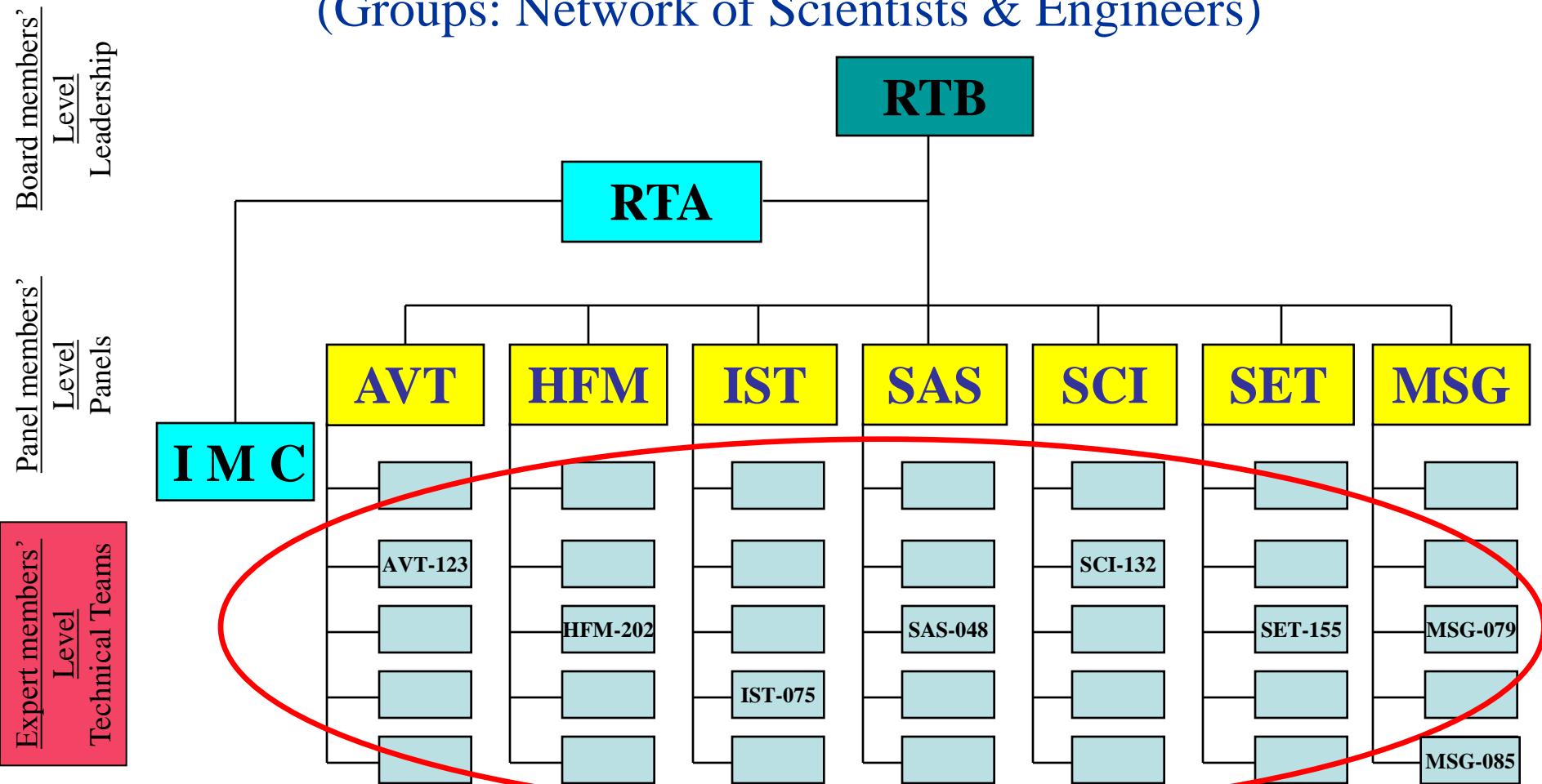
# RTO 2<sup>nd</sup> Level: Support Body (Panels & Group)

- **AVT**      **Applied Vehicle Technology Panel**
- **HFM**      **Human Factors and Medicine Panel**
- **IST**      **Information Systems Technology Panel**
- **SAS**      **System Analysis & Studies Panel**
- **SCI**      **Systems Concepts & Integration Panel**
- **SET**      **Sensors & Electronics Technology Panel**
- **MSG**      **Modelling and Simulation Group**



# RTO: 3<sup>rd</sup> Level

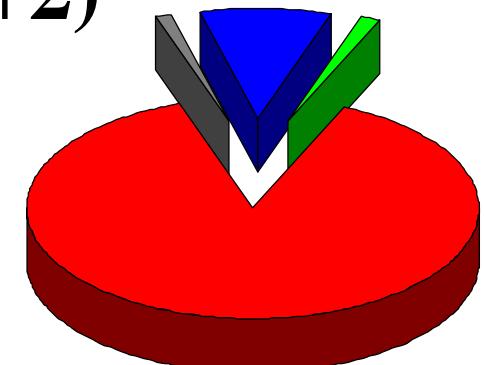
(Groups: Network of Scientists & Engineers)





## The RTO Network

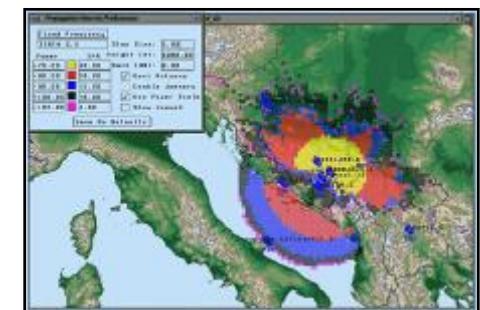
- **RTB Board Members (54)**
- **RTA Headquarters Staff (51+2)**
- **Panel/Group Members (344)**
- **Scientists/Engineers - (est. 3500)**





# The NMSG Mission

To promote co-operation among Alliance bodies, NATO member nations and Partner nations to maximise the effective utilisation of M&S.





# NMSG Leadership



**NMSG Chairman: Mr. Rob SMITH (GBR)**  
**Head of Weapon System Simulation & Experimentation**  
**MBDA**  
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**E/M : [rob.smith@mbda.co.uk](mailto:rob.smith@mbda.co.uk)**



**NMSG Vice Chair: Mr. Niels KRARUP-HANSEN (DNK)**  
**Danish Defence Acquisition and Logistics Organisation**  
**Senior Advisor, MSc.**  
**DNK Ministry Of Defence**  
**Tel : (+45) 40 46 45 49    Fax : (+45) 45 72 57 51 20**  
**E/M : [nkh@mil.dk](mailto:nkh@mil.dk)**



# MSCO - M&S Coordination Office



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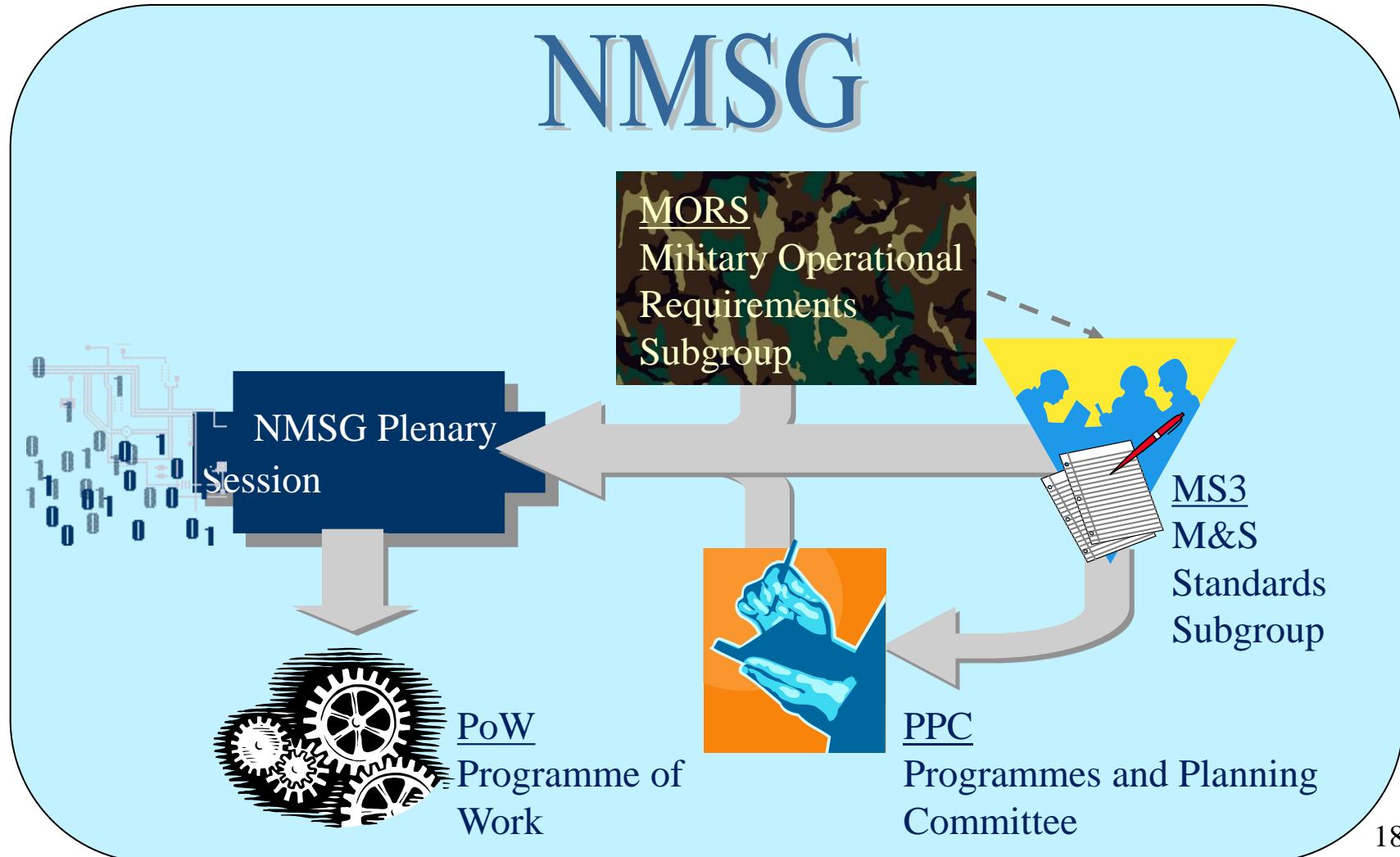


**MSCO Assistant: Ms Illeana GANZ (USA)**

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**E/M : ganzi@rta.nato.int**



# NMSG Structure: MORS, PPC & MS3





# NMSG - Membership

- Main nations are represented by both
  - Technical M&S Experts (from M&S **national offices**) generally responsible for M&S policy and development in their nation,
  - Military Officers (mainly interested in M&S **application** to support military activities).
- NMSG fully open to PfP nations and recently opened to Australia. MD under discussion.
- NMSG - the best opportunity for dialogue with nations!!
  - MORS: Military/Civilian Personnel from MoD
  - MS3: Technical Experts in Standards Mil./Gov./Acad.
  - PPC: Technical Experts in M&S from M&S, OR Offices
  - PLENARY: National reps with decision authority.



**NMSG Chairman:** Rob SMITH (GBR),

**Vice-Chair:** Niels KRARUP-HANSEN (DNK)

**MSCO Head:** Juan J. RUIZ (ESP),

**Deputy Head:** Vacant,

**Chief Scientist:** Vacant,

**Tech. Officer:** Adrian VOICULET (ROU), **Assistant:** Ms Illeana GANZ (USA)

**NATO:**

- Belgium
- Bulgaria
- Canada
- Czech R.
- Denmark
- Estonia
- France
- Germany



- Greece
- Italy
- Hungary
- The Netherlands
- Norway
- Poland
- Portugal
- Romania



- Spain
- Slovakia
- Slovenia
- Turkey
- United States
- United Kingdom



**Partners for Peace:**

- Belarus
- Finland



- Georgia
- Sweden



- Moldavia
- Uzbekistan



- FYROM
- Switzerland



**Contact Nations:**

- Australia



**Ex-Officio:**



ACO



ACT



IMS



NC3A



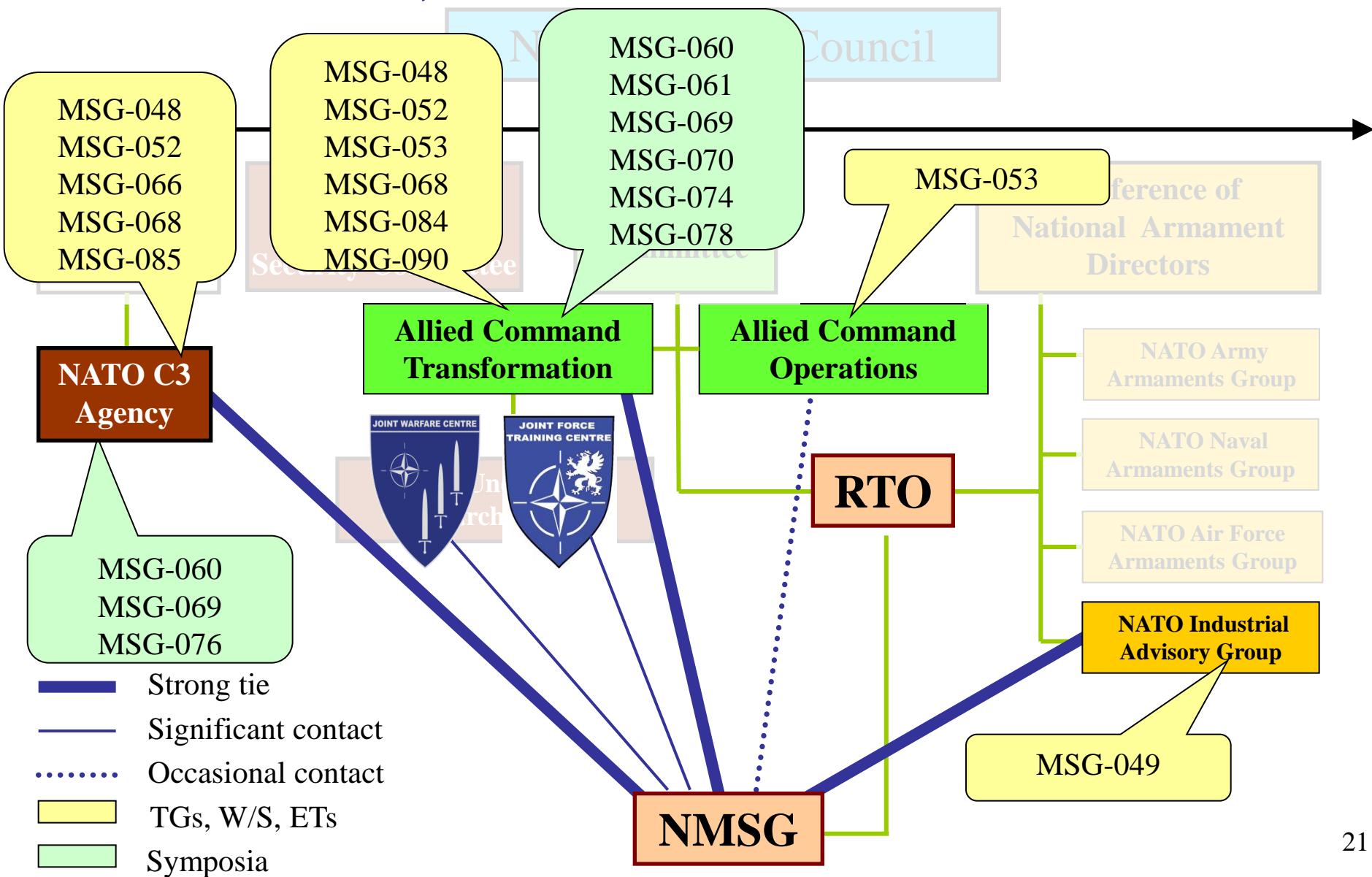
JWC



NIAG



# NMSG PoW, Involvement with NATO S&T





## The RTO Panels and Group

- R&T: Research
- S&T: Science
- R&D: Research
- New Technologies
- Low TRL scales
- Pure Sciences
- PoW driven by LTCR, DAT, ...

VS

- Technology
- Technology
- Development
- Applications
- High TRL scales
- Applied Sciences
- PoW driven by M&S MP objectives, LTCR, DAT, ...
- MSCO Should Provide Expertise (Chief Scientist)
- STANDARDS Activity

Scientists

Engineers



## NMSG PoW

Source: Nations  
Benefit: Nations

Natural Process  
– Driven by Nation needs.

- MORS 15%
- PPC 85%

Total 80%

Bottom-Up



Source: NATO  
Benefit:

– NATO & NATIONS  
Forced Process, driven by:

- LTCR, DAT, PSA
- NATO HP

Noticeable examples:  
– MSG-068  
– NATO M&S MP  
Update

Total 20%

Top-Down



# NMSG Terms of Reference

The **Mission** of the **NATO Modelling and Simulation (M&S)** Group (NMSG) is to promote co-operation among Alliance bodies, NATO Member Nations and PfP Nations to **maximise the effective utilisation of M&S**.

Primary mission areas include: **M&S standardisation, education, and associated Science and Technology**. The Group will provide **M&S** expertise in support of the tasks and projects within the RTO and from other NATO organisations.

The activities of the Group are **guided** by the RTO Rolling Plan and **governed** by the NMSG Strategy and Business Plan.



# M&S ≠ Interest for NMSG

- **MODELLING:**  
Action of creating a physical, mathematical, logical etc. representation of a system, entity, phenomenon, or process.
- **SIMULATION:**  
A method for implementing a model over time.



- **COMMON MISTAKE:**  
Not all M&S activities that fit the definitions are of interest to the NMSG, most of them are NOT!  
RTO Panels work on a daily basis with M&S, they (sometimes) do not know and we (sometimes) do not care.



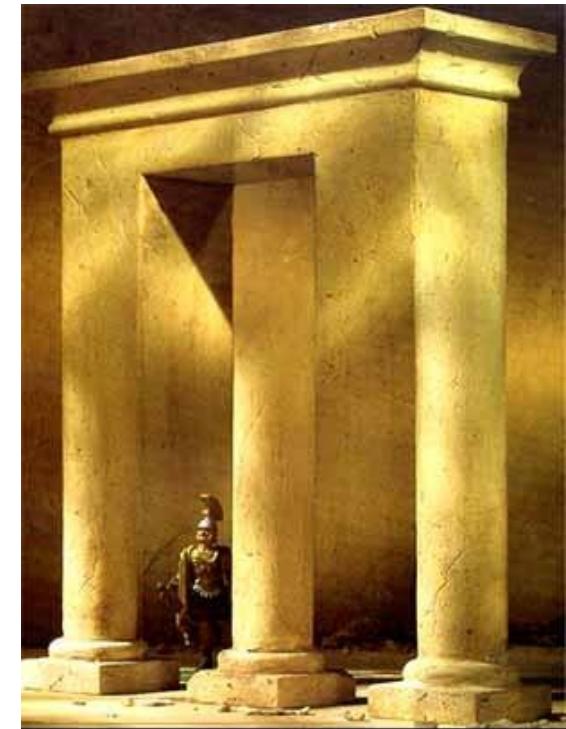
## NMSG Areas of Interest

There are **2** keywords to understand the PoW of the NMSG:

- 1 Interoperability
- 2 Reuse

There are **3** areas of interest in M&S for the NMSG:

- 1 M&S under a Federation Enabled Concept
- 2 M&S applied to Distributed Education & Training
- 3 M&S STANDARDS





# M&S Master Plan Objectives

## Objective      Objective      Objective      Objective      Objective

1

2

3

4

5

Establish a  
Common  
Technical  
Framework

Provide  
Common  
Services in  
NATO M&S

Develop  
Simulations

Employ  
Simulations

Incorporate  
Technological  
Advances

NMSG

NC3A, nations & industry

NATO Training Centers (JJJ) & NC3A



# M&S Master Plan Sub-Objectives

**1**

Establish a Common Technical Framework

**2**

Provide Common Services in NATO M&S

**3**

Develop Simulations

**4**

Employ Simulations

**5**

Incorporate Technological Advances

**1.1** Adopt HLA  
**1.2** Establish data interchange standards

**2.1** Compile M&S information  
**2.2** Provide M&S education  
**2.3** Establish a Simulation Resource Library  
**2.4** Establish a helpdesk

**3.1** Identify & prioritize requirements  
**3.2** Identify strategies  
**3.3** Allocate resources  
**3.4** Execute strategy  
**3.5** Provide feedback

**4.1** Plan employment  
**4.2** Provide resources  
**4.3** Provide databases  
**4.4** Operate simulations  
**4.5** Conduct Impact Assessment

**5.1** Monitor M&S-related advances  
**5.2** Conduct R & D  
**5.3** Share information  
**5.4** Implement advances



# M&S Application Areas



Strategic

Operational

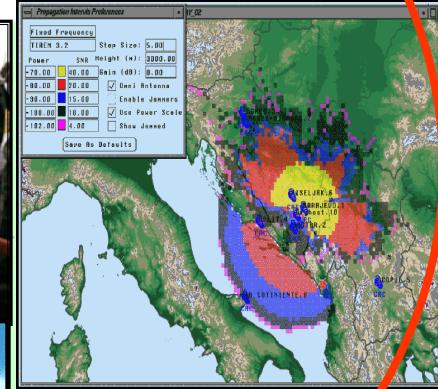
Tactical

Systems

Acquisition

Education and Training

Planning and Analysis





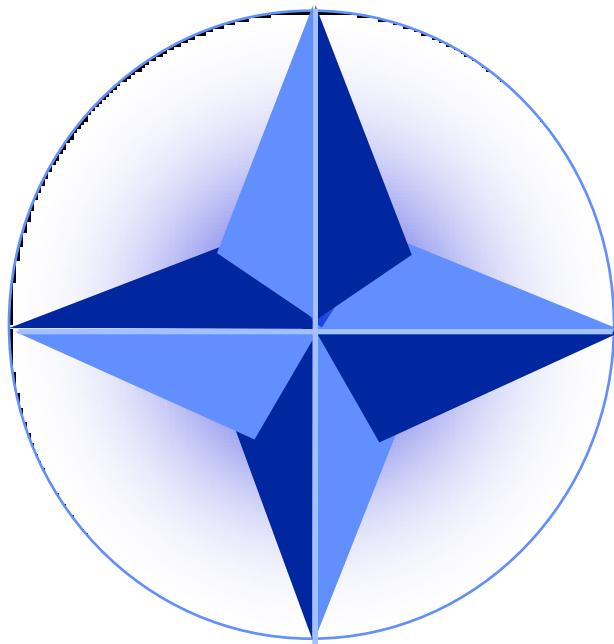
# Classification of the NMSG Activities

- Standards Related - 30%
- Best practice (Info exchange) - 40%
- Applications/Experimentation - 30%



# NMSG Activities

- Working groups (Task Groups / Exploratory Teams)
  - Minimum of 4 nations / Not required
  - 3 years / 1 year
  - Final Report / Report, TAPs
- Organising Conferences, Workshops, Lecture Series, Seminars, Specialists Teams ...
  - NMSG Annual Conference 2009 Brussels, 2010 Utrecht
- Participating to M&S related events
  - ITEC, I/ITSEC
  - SISO International Workshops
  - National M&S Conferences (IberSIM 09, USMOS 09) ...



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## NMSG: Examples of Technical Activities



*North Atlantic Treaty Organisation*





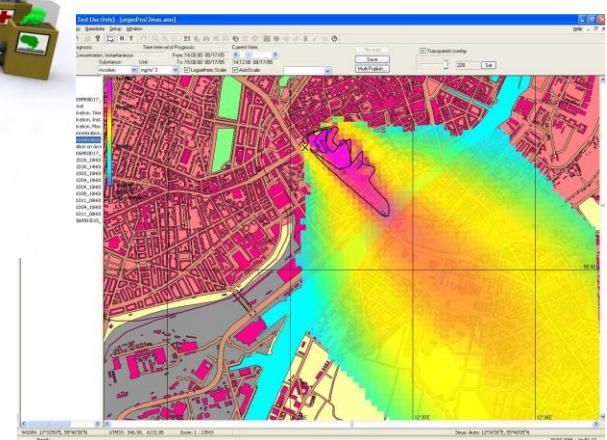
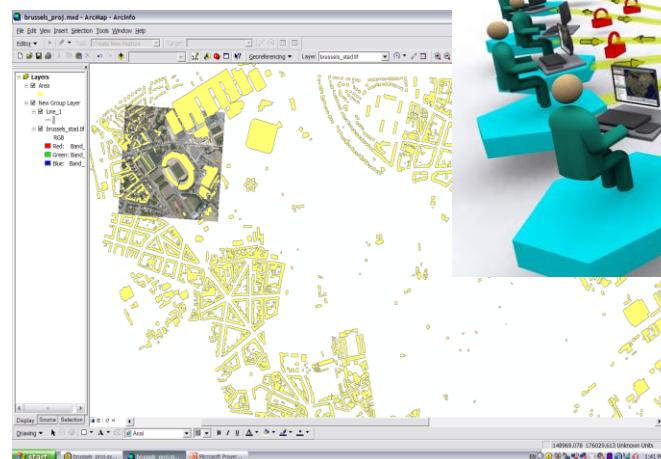
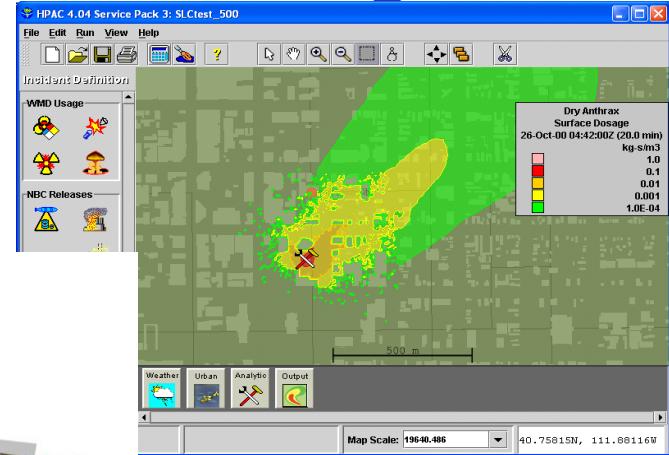
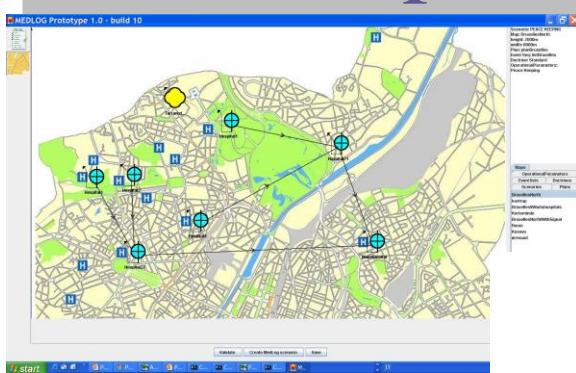
# MSG-048 / MSG-085

## Coallition Battle Management Language



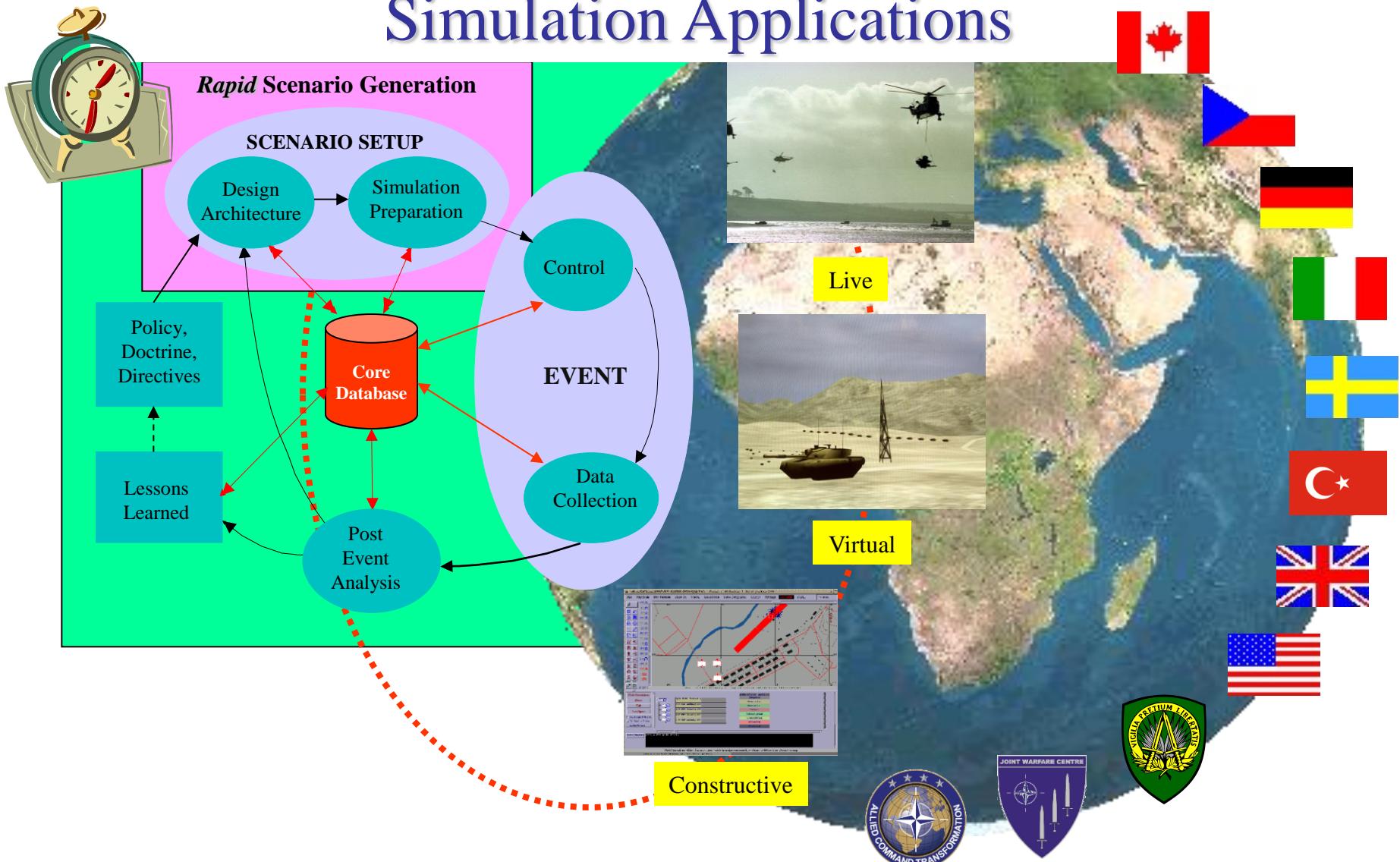


# MSG-049: M&S System for Emergency Response Planning and Training





# MSG 053 – Rapid Scenario Generation for Simulation Applications





## URBAN COMBAT ADVANCED TRAINING TECHNOLOGY 2



MSG-063





MSG-068

NATO Training Federation (NTF)





# MSG-069

## NMSG M&S Conference



**RMA, Brussels**  
Week of 15-16 October 09



# MSG-076

## NMSG M&S Conference 2010

***Blending LVC Simulation to Better Support Training & Experimentation***



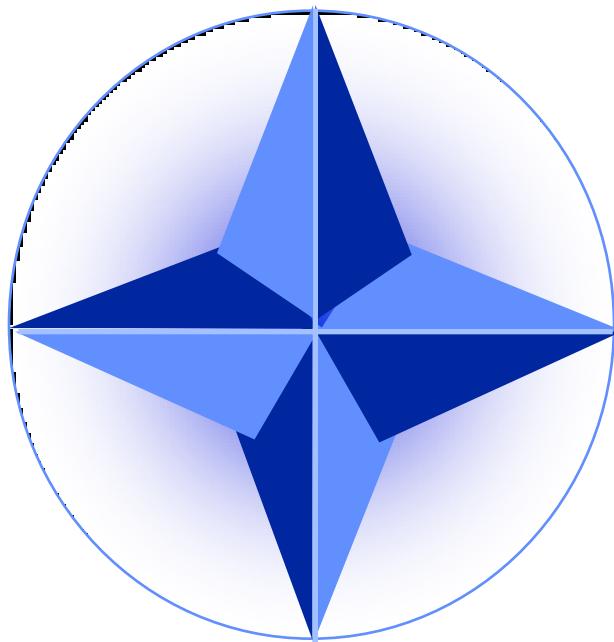
**Call for Papers – [www.rto.nato.int](http://www.rto.nato.int)  
Deadline for abstracts 30 May 2010**

**Utrecht, The Netherlands  
Conference Centre in Soesterberg  
16 and 17 September 2010**



## C-BML presence in the NMSG Events





# OTAN - NATO

**NMSG: MS3**  
**M&S Standardisation in NATO**



*North Atlantic Treaty Organisation*





# NMSG M&S Standards Activity:

- With the disbandment of NATO Army Armaments Group and Land Group 8 in Apr 03.
  - NMSG was officially named as the Delegated Tasking Authority for NATO M&S standards by CNAD in 2003

Thank you for your letter of 8 August requesting the delegation of authority to the Research and Technology Board's NATO Modelling and Simulation Group (NMSG) for the development, production and maintenance of NATO Standardization Agreements (STANAGs) and Allied Publications (APs).

The plan developed by the NATO Army Armaments Group (NAAG) for the closure of Land Group 8 on Simulation Interoperability for Joint Training and Operational Support proposed the transfer of that group's responsibility for fostering interoperability in the area of modelling and simulation to NMSG. This proposal was supported by the Conference of National Armaments Directors (CNAD). With responsibility must come authority, so as Chairman CNAD I fully support your request and would ask Director NATO Standardization Agency to note the delegation of this function, in accordance with Section 109 of reference, to NMSG.

To ensure good co-ordination between the efforts of NMSG and those of other CNAD bodies, I would ask that NMSG regularly brief those groups with an interest in this area on its activities, in particular the NAAG.

- NATO (RTO) Signed a TCA with SISO in 2007



# NMSG M&S Standards Activity:

- High Level Architecture (HLA)  
STANAG 4603; has been  
Promulgated by NSA 02 Jul  
2008. Nations continue  
ratification in 2009
- Synthetic Environments Data  
Representation and Interchange  
Specification (SEDRIS)  
STANAGs 4662, 4663 & 4664;  
in ratification process right now.





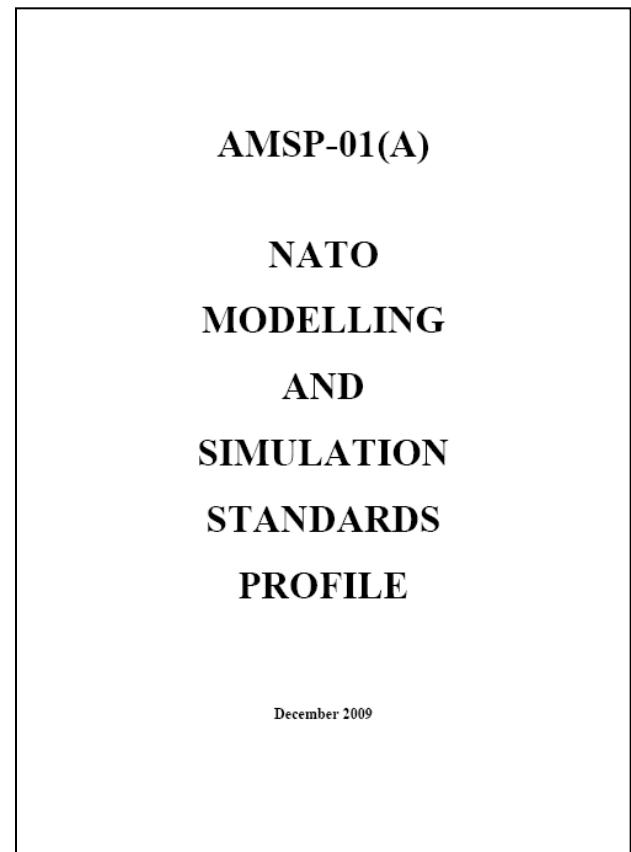
# M&S Standards Sub Group (MS3)

- First Allied Publication on Modelling & Simulation AMSP-01:

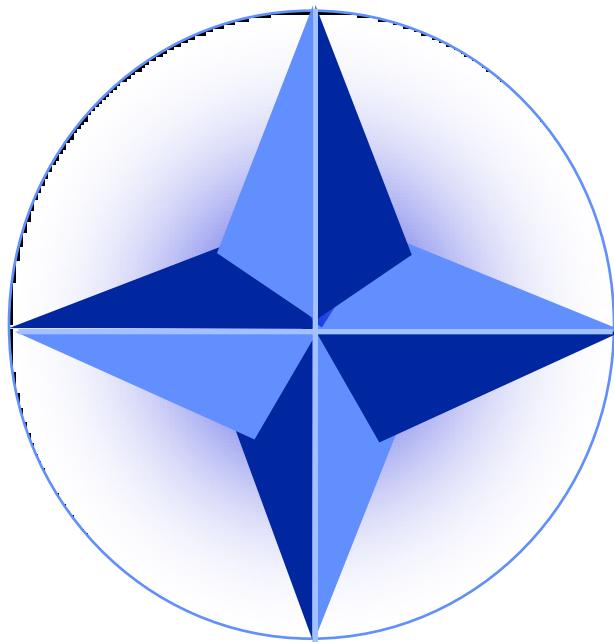
## **NATO Modelling & Simulation Standards Profile.**

Promulgated and published by the NATO Standardization Agency (NSA) in Dec 2009.

<http://www.nato.int/docu/stanag/amsp/AMSP-01.pdf>



- The MS3 will host the HLA Certification Advisory Group, **CeAG** following completion of RTO TG MSG-050 – HLA WG.



# NATO - OTAN

**NMSG:  
NATO M&S Master Plan Update**



*North Atlantic Treaty Organisation*





# NATO M&S Master Plan

CNAD created SGMS in 1996 to:

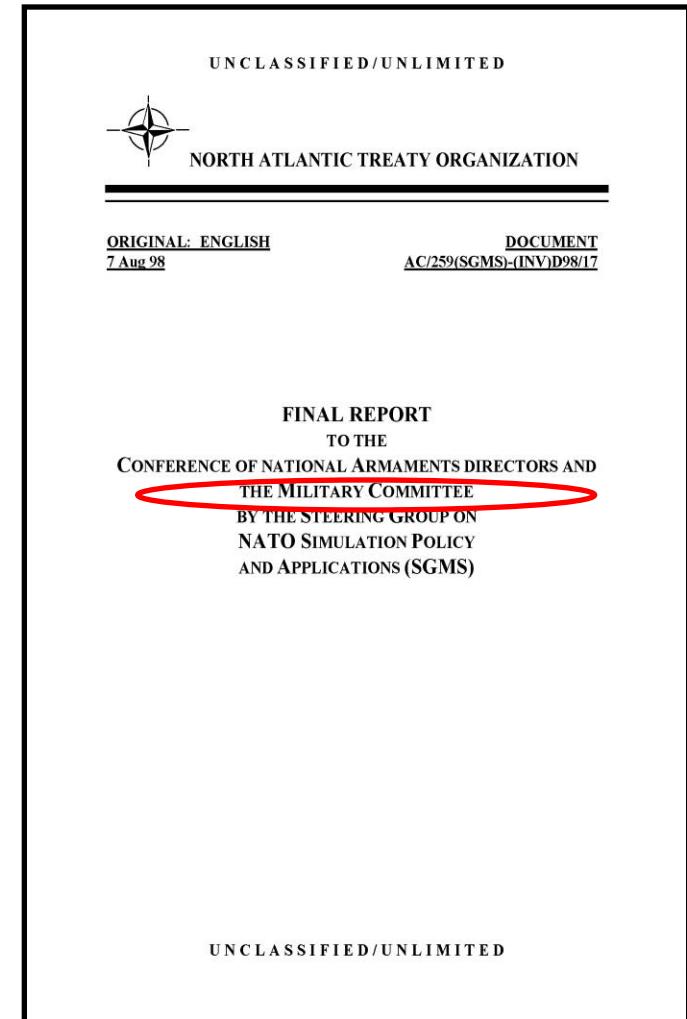
Craft an Alliance approach to  
achieve **Simulation**  
**Interoperability** and **Reuse**

Develop a preliminary **NATO M&S**  
**Master Plan**

Draft a roadmap to achieve  
prioritized NATO Simulated  
Environments

Recommend NATO Policies  
regarding M&S Management

Present a Final Report through the  
**RTB**, to **CNAD** and **MC**





# NATO M&S Master Plan

SGMS's Final Report consequences:

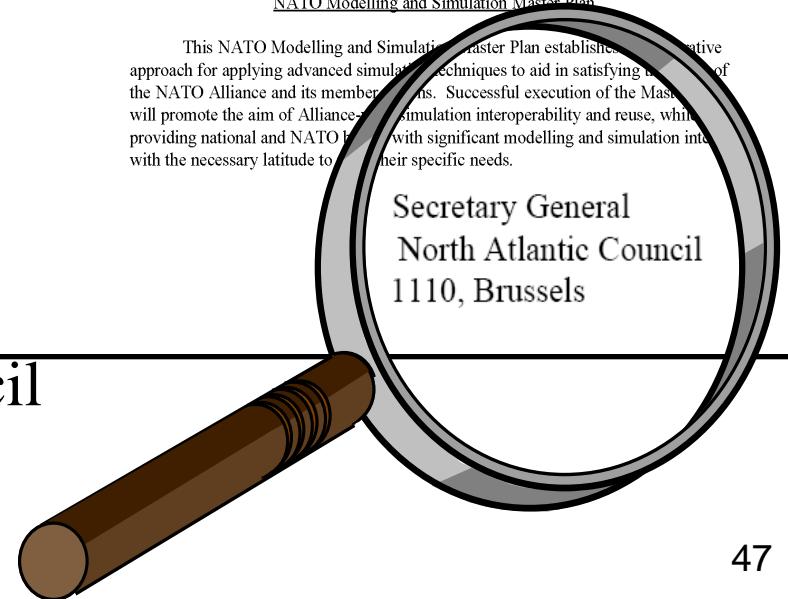
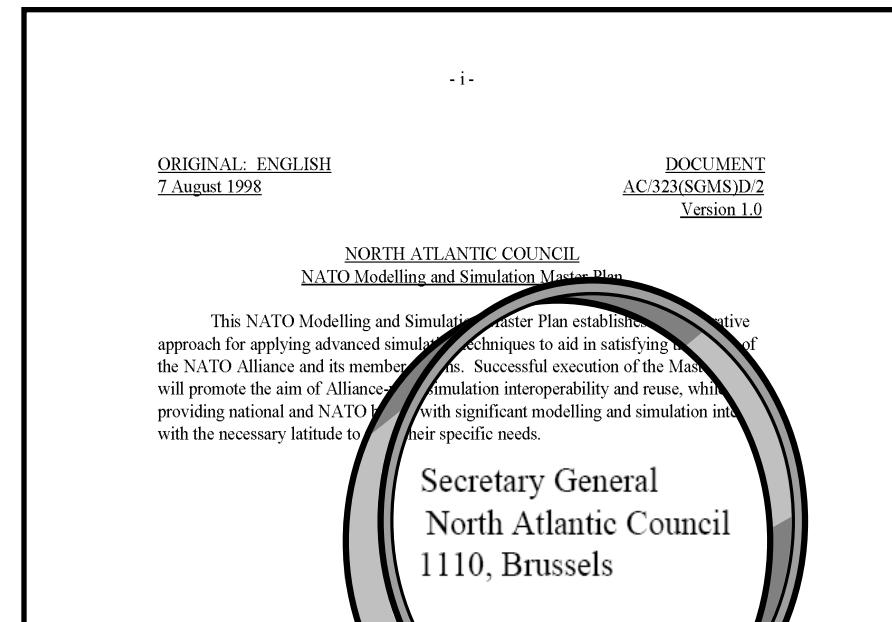
NATO M&S Master Plan

NATO Policy on M&S:

Creation of NMSG

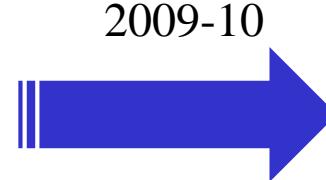
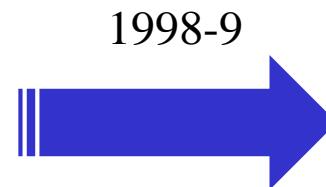
Creation of MSCO

Approved by North Atlantic Council





# NATO M&S Master Plan



NATO and M&S have evolved since 1998!  
NMSG still guided by the NATO M&S MP



# Changes in NATO since 1998 (I)

- New NATO Command & Force Structure:
  - ACO with Operational Responsibility
  - ACT with Transformation Responsibility, including partnership with USJFCOM
- NATO Centers of Excellence
- Changes in NC3A
- New JWC
- New JTFC
- New JALLC



# Changes in NATO since 1998 (II)

NATO changed Policy:

Type of Operations, Humanitarian, DAT, Piracy ...

Relation with new Partners

New Requirements: High Readiness Forces

Rapid Reaction Corps

Rapid Deployable Forces

New player EUROCORPS

Low Readiness Forces

NATO Response Force

In summary:

A whole spectrum of new Training Requirements ...



## Changes in M&S since 1998

“The M&S market is in the middle of a disruptive transition from

Low-volume,  
High-priced simulations,  
Custom-made for each application

to a

High-volume,  
Low-priced market,  
Interoperable COTS, GOTS products.

This explosion of simulation deployment will have a similar effect to what the PC did to the mainframe or the GPS to the nautical chart or map.”

Warren Katz, Spring 2008 – EuroSATORY

... and new approaches to maximize the effective utilisation and co-ordination of M&S (NMSG Mission)



## Want to know more?: <http://www.rto.nato.int/>

**NATO Research & Technology Organisation - Microsoft Internet Explorer provided by RTA V3.2**

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Thursday, February 11, 2010

**NATO Research and Technology Organisation**

[www.rto.nato.int](http://www.rto.nato.int)

**R&T Organisation**

- Home
- General Documentation
- RTO Activities
- RTO Future Events
- Search Scientific Publications
- National Distribution Centres

**R&T Coordination**

- Research & Technology Board
- National Coordinators
- Research & Technology Coordination Group

**Technical Panels**

- Applied Vehicle Technology
- Human Factors & Medicine
- Information Systems Technology
- System Analysis & Studies
- Systems Concepts & Integration
- Sensors & Electronics Technology

**Modelling & Simulation**

- NATO Modelling & Simulation Group

**NATO SMART**

**Information Management**

- Information Management Committee

**Partners**

- Partner Nations



**The NATO Research & Technology Organisation**

The NATO Research and Technology Organisation (RTO) promotes and conducts co-operative scientific research and exchange of technical information amongst 28 NATO nations and 38 NATO partners. The largest such collaborative body in the world, the RTO encompasses over 3000 scientists and engineers addressing the complete scope of defence technologies and operational domains. This effort is supported by an executive agency, the Research and Technology Agency (RTA), that facilitates the collaboration by organising a wide range of studies, workshops, symposia, and other forums in which researchers can meet and exchange knowledge.

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**Life Cycle Costing Spreading Throughout NATO**



It seems that nearly all national defence planners face a familiar problem: budgets for modernization are severely impacted by unanticipated expenditures necessary for training, maintenance, personnel and disposal costs associated with equipment currently in their inventory. While this is a common situation, it is manageable and often avoidable with the proper application of Life Cycle Costing (LCC) principles. What is Life Cycle Costing? Quite simply, it is the process of collecting, estimating and quantitatively analyzing cost data throughout the entire service life of a system, in order to produce a realistic projection of the "true" cost of procurement commitment.

In the fall of 2009, the System Analysis and Studies (SAS) Panel of the RTO published the "Code of Practice for Life Cycle Costing", a practical handbook designed to illustrate LCC methods and benefits to decision-makers involved with procurement choices. This work, produced by SAS-069, captured and synthesized ground-breaking work in this field from previous SAS studies and from the AC/327 Working Group 3.

It was recently announced that because of the importance of LCC, the NATO Defence Procurement Management Course has incorporated a review of LCC principles in its finance lesson, citing SAS-069's efforts. This course, given once a year in Ottobrunn, Germany, trains middle and senior level NATO managers in defence procurement, with an emphasis on cooperative international acquisition.

Now, in order to maximize the dissemination of the life cycle costing approach, the NATO Life Cycle Management Group, AC/327, is leading the incorporation of the Codato guidelines into an Allied Publication. This will complement the current NATO

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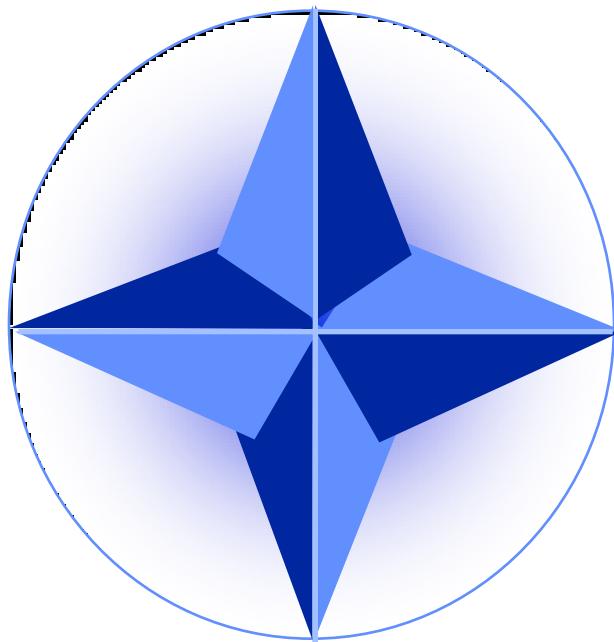
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# Questions





# OTAN - NATO

**The Research & Technology  
Organization (RTO).  
The NATO Modelling &  
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*North Atlantic Treaty Organisation*





# Back-up slides



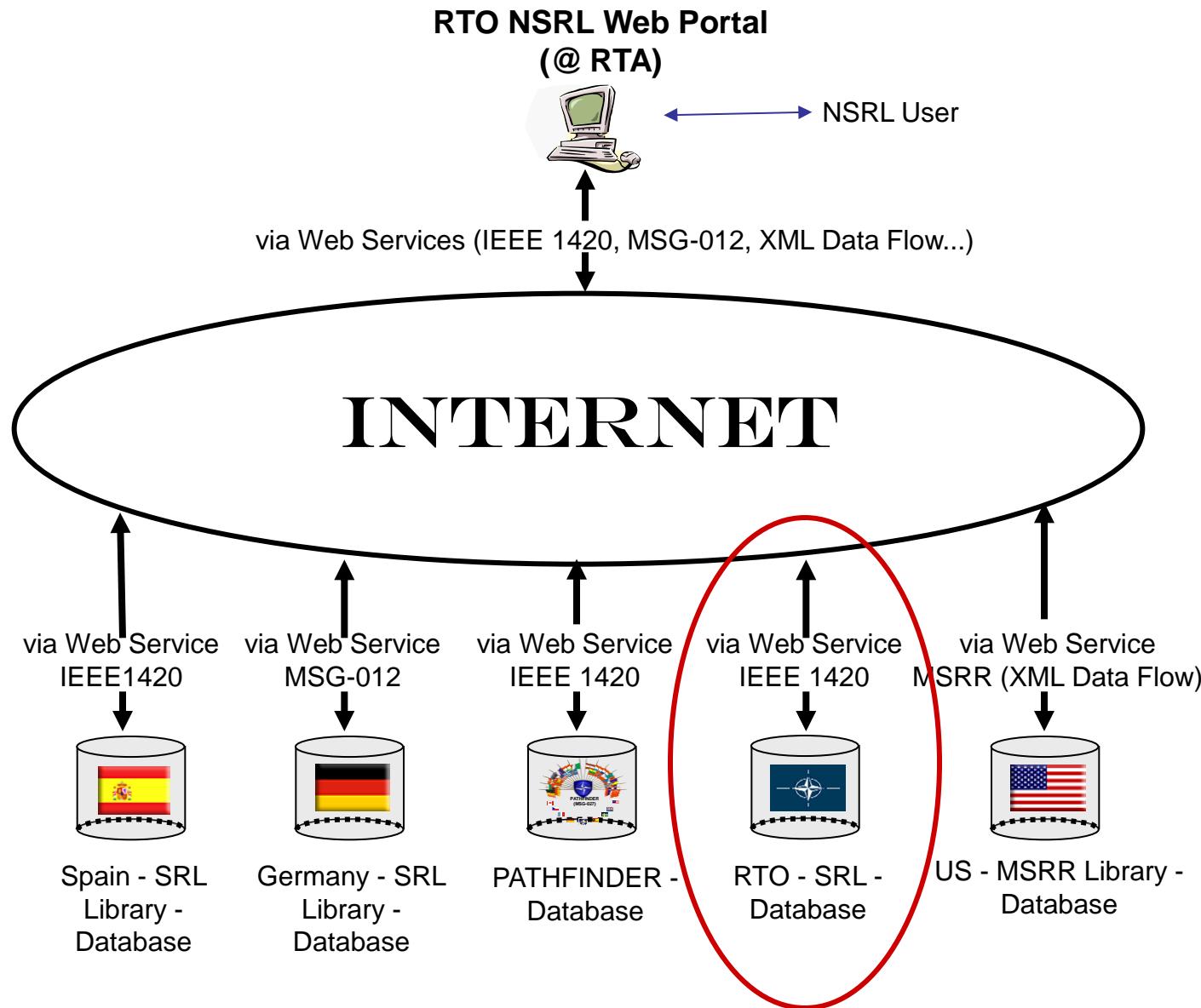
# *NATO Simulation Resource Library (NSRL)*

## Background

- a generic, distributed, multi-user application which allows for searching, retrieving and uploading of resources from different locations spread over interested NATO/PfP Nations & Organisations
- a fundamental tool to facilitate interoperability and reuse of M&S resources amongst NATO/PfP Nations
- a NATO RTA funded project – requirement derived from the NATO Modelling & Simulation (M&S) Master Plan



# Architecture for NSRL





## NSRL REGISTRATION PROCESS

NATO Research & Technology Organisation - Microsoft Internet Explorer provided by RTA V3.2

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Address http://www.rto.nato.int/

Tuesday, April 08, 2008

NATO Research and Technology Organisation

www.rto.nato.int

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Modelling & Simulation

- NATO Modelling & Simulation Group
- NATO SMART (Simulated Mission & Rehearsal Training)

Information Management

- Information Management Committee

Partnership for Peace

- Partner Nations

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1988 - 2008

**The NATO Research & Technology Organisation**

The NATO Research and Technology Organisation (RTO) promotes and conducts co-operative scientific research and exchange of technical information amongst 26 NATO nations and 38 NATO partners. The largest such collaborative body in the world, the RTO encompasses over 3000 scientists and engineers addressing the complete scope of defence technologies and operational domains. This effort is supported by an executive agency, the Research and Technology Agency (RTA), that facilitates the collaboration by organising a wide range of studies, workshops, symposia, and other forums in which researchers can meet and exchange knowledge.

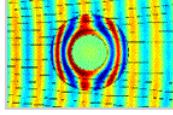
**The von Karman Institute for Fluid Dynamics (VKI) Seeks New Director**

 VKI, not to the RTA.

The RTO has a long-standing relationship with the Von Karman Institute for Fluid Dynamics (VKI) conducting numerous joint activities. The VKI is now advertising for a new **Director** to replacing the retiring incumbent. To enable the widest dissemination of the advertisement for this vital and prestigious position and in view that some of the members of the RTO network have an interest in this position, please [click this link](#) to see the full announcement. Responses should be sent directly to the

Mar 20, 2008

**Photonic Metamaterials for Defence and Security Applications**

 Metamaterials open a whole new chapter of photonics connected with novel concepts and potential applications and are promising for a variety of optical and microwave applications, such as new types of beam steerers, modulators, band-pass filters, lenses, microwave couplers, and antenna radomes. Microwave and optical superlenses have been created, and 'cloaking' devices have been proposed.

The NATO R&T SET-123 **Task Group** on "Nanomaterials for Sensors, Sources, and EM Manipulation" invited nine experts from around the world to give lectures on metamaterials, to be followed by general discussion among the participants and attendees.

Topics to be covered by this **SET-139 workshop** include: metamaterials in the optical regime for cloaking or stealth applications, light concentration or enhancement, and other optical/photonics applications and devices that may be of use in defence or security scenarios.

For further information on this workshop, please contact [guadalupe\[at\]rta.nato.int](mailto:guadalupe[at]rta.nato.int) or [dave.cardimona\[at\]kirtland.af.mil](mailto:dave.cardimona[at]kirtland.af.mil) (please replace [at] by @).

Mar 14, 2008

**RTB Chairman Participates in Weapons of Mass Destruction Workshop**

 The RTB Chairman, IGA Jacques Bongrand, was recently invited to attend an ad hoc Workshop on Improved Cooperation and Coordination of CBRN Activities at Senior defence Group on Proliferation DGP Plenary level, on Tuesday 26th February 2008 at NATO HQ in Brussels. The

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**AVT-152** (05/05/2008 to 08/05/2008 in Norway) - Symposium on "Limit Cycle Oscillation and Other Amplitude-Limited Self-Excited Vibrations"

**AVT-154** (05/05/2008 to 09/05/2008 in Norway) - Specialists Meeting on "Advanced Methods in Aeroelasticity"

**HFM-142** (21/04/2008 to 23/04/2008 in Denmark) - Symposium on "Adaptability in Coalition Teamwork"

**IST-083** (21/04/2008 to 22/04/2008 in Czech Republic) - Symposium on "Military Communications with a special focus on Tactical Communications for Network Centric Operations"

**IST-21-PBM** (23/04/2008 to 25/04/2008 in Czech Republic) - 21st

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# QUESTIONS ?

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